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ONAN® RV GENERATOR QUICK TROUBLESHOOTING GUIDE USING THE G-MAN®

INTRODUCTION

The G-MAN is designed with the RV generator service technician in mind. Diagnosis can account for up to 80% of service labor cost. This versatile service tool speeds the troubleshooting process by eliminating guesswork and pinpointing problems. Troubleshooting is broken down into the four specific areas of the ENGINE, ENGINE CONTROL, GENERATOR and REGULATOR. Generator control troubleshooting can be complicated by the normal action of the control to prevent starting or cause a shutdown in the event of a problem. This can be a “dead end” that prevents the troubleshooting process from moving forward without guesswork, jumper wires and/or parts substitution. This approach can be both time-consuming and expensive.

What makes the G-MAN unique is its ability to plug in to the generator’s control system and become a part of it, instead of being a circuit board or component tester. You can run the engine without the control board because the G-MAN takes over most of its functions. If any of the signals to the control board are missing, the G-MAN will tell you. If operation is normal with the G-MAN but not with the control board plugged in, then you know right away that you have a bad control board. This is known as testing by exception.

DISCLAIMER: The G-MAN service tool is designed for use by generator service professionals and others who are familiar with engine-generator sets and their controls. Working on engines, generators and their controls presents certain hazards to equipment and personnel. It is assumed that the G-MAN user is adequately trained in the proper use of test equipment and the management of risks inherent in generator servicing. The G-MAN is not intended for use by the general public. Flight Systems is not responsible for damage to equipment or injury to personnel, direct or consequential, arising from the use of the G-MAN service tool. Liability is limited to repair or replacement of defective product under the terms of the standard warranty.

This service tool is designed for use ONLY on 120 volt, 50 or 60 Hz, single-phase generators using a 12-volt negative ground electrical system.

GETTING STARTED

Determine the control board part number directly from the board or from the Application Chart. Refer to the Troubleshooting Chart for test information specific to that board. G-MAN responses are different for different control boards. Connect the appropriate adapter to the G-MAN control harness. CAUTION: Some adapters look similar and have identical connectors, but a different pin assignment. Improper connections can cause damage to the generator controls and/or to the G-MAN. Such damage is not covered by the warranty.

Before proceeding with evaluation of the controls, regulator or generator, the Onan engine must have oil and fuel, be in running condition and the 12-volt battery charged. The electronic governor, 151-0752, on Models BGM and NHM, Spec B and later, must be functioning properly. This guide does not cover engine maintenance and repair procedures (please refer to the applicable Onan Service Manual for this information). The most common genset problems are caused mainly by lack of use and/or lack of regular monthly exercise and include the following:

- Low battery voltage because of insufficient charge, worn out battery, faulty cables (partly broken or corroded) or poor connections, resulting in slow cranking and hard starting.
- Old or contaminated fuel that has gummed up the lines, fuel filter and carburetor. This can cause clogged jets (mixture too lean) and/or a stuck carburetor float resulting in an improper mixture (too rich or too lean) or flooding.
- Weak spark and/or fouled spark plug(s) causing hard starting and rough running.
- Stuck automatic choke causing an excessively rich mixture and smoking.
- Stuck oil pressure switch causing shutdown as soon as the start button is released.
- Dirty air filter, causing an excessively rich mixture and smoking.
- Low oil level preventing starting on models equipped with low oil level switch.
- Wiring harness damage from rodents chewing on the wires.
- Corrosion of control board or connections from salty air or road chemicals.
- Dirty and/or oxidized slip rings causing high field circuit resistance.

After the engine has been running for a few minutes, the electric choke heater should begin to open the choke. The choke will take longer to open fully in cold weather. If the choke does not open, it is either stuck or the choke heater is not working. The choke mechanism can be freed up and maintained with “Mouse Milk”, a high temperature penetrating lubricant. *(Available from Flight Systems)* If the engine surges or “hunts” (does not stay at a constant RPM), the cause is likely a gummed-up carburetor or an improperly adjusted governor. These conditions must be corrected.

To prevent possible damage to external circuits or appliances, MAKE SURE that the *AC CIRCUIT BREAKER IS OFF* during control and generator testing.

SYSTEM TESTS

1. CHECK OIL. Check engine oil level before starting.

2. GAIN ACCESS. Remove panel or cover to gain access to the control board. Some disassembly may be required. The exact procedure depends on the model. Detailed procedures are given in the G-MAN manual.

3. CONNECT G-MAN CONTROL HARNESS. Unplug the control board and connect the G-MAN adapter in its place (the G-MAN does not connect to the remote harness). As soon as the G-MAN has 12-volt power, the 12VDC POWER indicator will come on. The LOL/LOP SWITCH indicator may also come on, depending on the model. See Chart.

4. CONNECT G-MAN REGULATOR & GENERATOR HARNESS. Disconnect the regulator and plug the G-MAN's GENERATOR harness into the plug just removed from the regulator. Plug the G-MAN's REGULATOR harness into the regulator (or a known good regulator).

5. CHECK BATTERY VOLTAGE. Connect the negative voltmeter lead to the GROUND jack and the positive lead to the 12 VDC POWER jack on the G-MAN and read the battery voltage. A fully charged battery in good condition should read 12.6 to 12.8 VDC. Charge the battery if necessary. IMPORTANT: Disconnect battery charger before proceeding with tests.

6. CHECK CRANKING/ENGINE START. Turn on the IGNITION/FUEL switch. The fuel pump should be heard working. Apply 12 volts directly to the pump if necessary. Press the START button and the engine cranks. If not, check the wiring to the start solenoid. The battery voltage should not fall below 9.5 VDC during cranking. If so, check the battery condition and cables. The IGNITION/FUEL switch on the G-MAN is used to stop the engine. If the engine starts and runs OK, proceed to step 9.

7. CHECK SPARK. If the engine cranks but does not start, remove a spark plug and check for spark during cranking. Problems such as dirty /worn points or a defective coil can cause loss of spark. On models where the oil level switch is hard-wired to the magneto (KV Spec. C-F, KVC and KVD), low oil level or a stuck switch will inhibit the spark and prevent starting. To check the level switch, unplug the control board and verify that the MAGNETO KILL circuit on the control harness is not grounded. Refer to the Troubleshooting Chart.

8. CHECK FUEL SYSTEM. If the engine cranks and has spark but does not start, the problem is likely fuel related. This can be confirmed by injecting a small amount of starting fluid into the air intake. If the engine fires and tries to run, it is starving for fuel. Listen for the fuel pump running during cranking. The pressure and flow of the fuel pump (and fuel filter) can be checked by temporarily disconnecting the fuel line to the carburetor. Take adequate precautions when handling fuel. If pressure and flow are normal, reconnect fuel line. Note: If the generator has not been run for several months, the carburetor float may be stuck closed and /or the jets and needle valves may be gummed up by old fuel that has turned to varnish. These conditions interfere with normal fuel delivery. The automatic choke may be stuck closed or binding so that it does not open as the choke heater warms up (causes smoking). On Models BGM and NHM spec. B and later, make sure that the electronic governor goes to full throttle one second after cranking begins. Any of these conditions will prevent the engine from starting or running smoothly and must be corrected before proceeding.

9. CHECK FIELD FLASH. Field flash is energized automatically during cranking and until generator voltage builds. During cranking, the FIELD FLASH indicator should be on, showing that the field flash voltage is actually reaching pin 7 of the regulator. The field flash can also be tested manually at any time by pressing the FIELD FLASH button. Measure the field flash voltage at the FIELD FLASH test jack. It should be 10-11 VDC. If not, check the wiring between the control board field flash output pin on the harness and regulator plug pin 7.

10. CHECK RUN RELAY. After the engine starts, the FIELD FLASH indicator goes off and the RUN RLY indicator comes on. This indicates that the signal required to pull in the run relay in the G-MAN is present (see chart) and that the starter is locked out. If the RUN RELAY indicator does not come on, there may be a problem with the generator, regulator, electronic governor or oil pressure switch, depending on the model. In this case, proceed to the Generator and/or Regulator section (except 300-2784/2943). Also, if the RUN RLY indicator is not on, then the starter is not locked out and damage could result if the starter button on the G-MAN is pressed while the engine is running.

11. CHECK LOL/LOP SWITCH. As soon as oil pressure builds, the LOL/LOP SWITCH indicator will come on (or go off, depending on model) indicating that the oil pressure switch has been actuated (see chart). Some models use a low oil level switch instead (see step 7 above). Check the voltage at the LOL/LOP SWITCH test jack (see chart). If the LOL/LOP SWITCH indicator does not come on (or go off), the cause is likely a stuck switch. Starting the engine several times, or tapping on the switch can sometimes cure this. If the LOL/LOP indicator fails to come on, a broken wire from the switch to the LOL/LOP input of the control board can also be the cause. Electronic governor only: When the LOP switch opens, the governor module places a ground on the oil pressure input of the control board (P1-5). It is OK to temporarily ground P1-5 on this model to keep the engine running for troubleshooting purposes. NOTE: See chart for oil pressure and oil level switch locations.

12. CHECK FIELD VOLTS. The FIELD VOLTS indicator should be on, indicating that the regulator is producing at least 28-35 VDC. If not, proceed to the Generator and/or Regulator section.

13. CHECK AC OUTPUT. The STATOR AC VOLTS indicator should be on, indicating that the main stator is producing at least minimum voltage. On some models, the L1 AC VOLTS indicator should also be on (see chart). If not, proceed to the Generator and/or Regulator section.

14. CHECK BATTERY CHARGING. If there is normal AC output (except PMG), measure the voltage at the BAT. CHG. VOLTS test jack where applicable (see chart). Some models use a charging resistor and some models use a PMG and a charging regulator, VR2 (see G-MAN manual for details). On all models equipped with battery charging, the voltage at the 12 VDC POWER test jack should slowly rise with the control board in place and the genset running. A slowly rising voltage indicates that the battery charging function is working.

15. CHECK CONTROL BOARD/MODULE. If the engine runs with the G-MAN and all indications are normal, but not when the control board or module is plugged in, then it is very likely that the control is defective. If there is AC voltage present on B1-B2 or L1 AC, as applicable, and the correct oil pressure/level signal is present at the OIL LOL/LOP SW input of the control board, and the engine will not keep running, the control board is defective.

GENERATOR TESTS

Generator Resistance Tests (non-running)

1. Disconnect the regulator and plug the G-MAN's GENERATOR harness into the plug just removed from the regulator. DO NOT connect the REGULATOR harness to the regulator.

2. Connect the DMM between the red MAIN STATOR test jack T2, T4 and the GROUND test jack and measure approximately 0.0 to 0.1 ohms.

3. Connect the DMM between the red MAIN STATOR test jacks T1,T3 - T2,T4 and measure approx. 0.3 to 0.4 ohms.

4. Connect the DMM between the yellow AUX STATOR test jacks Q1-Q2 and measure approximately 2.0 to 3.5 ohms.

5. Connect the DMM between the blue BAT. STATOR test jacks B1-B2 and measure approximately 0.1 to 0.2 ohms (models with battery charging stator only).

6. Connect the DMM between the green FIELD test jacks F1-F2 and measure the rotor resistance (see chart for values). Values are specified at 77 F, 25 C + 10%. If resistance varies with rotor position, this usually indicates slip ring or brush problems. Tap the starter button and take several readings. If the reading is high and/or not constant, clean the slip rings (use the Slick Stick or similar tool) and repeat the test. If this does not correct the problem, check the brushes. Excessively low resistance indicates a possible rotor short, while a high resistance indicates slip ring and/or brush problems. Either a high or low resistance condition can lead to regulator failure and must be corrected.

NOTE: All windings should read "infinity" to each other at the test jacks.

Rotor Resistance Test, Flying Short/Open

It is possible, although uncommon, to have a mechanically induced short, partial short or open in the rotor that shows up only when it is spinning. This type of fault occurs when rotor windings shift slightly due to centrifugal force and/or temperature rise and can be difficult to track down. To perform this test, proceed as follows.

1. Follow step 6 above under Generator Resistance Tests, except use a VOM analog-type meter such as a Simpson 260 in place of the DMM. The DMM will give an erroneous reading because of the small DC voltage induced in the rotor when it is spinning. Connect the VOM positive lead to the F1(+) test jack and the negative lead to the F2(-) test jack. Obtain a stable reading within the range specified and record.

2. Start the engine and observe which way the needle moves. A significant drop in resistance indicates a flying short, especially if it is repeatable. A high reading or "infinity" indicates a flying open. A slight apparent rise (1-3 ohms) in field resistance is normal and is due to the small induced voltage in the spinning rotor influencing the VOM. A defective rotor must be repaired or replaced.

Generator Leakage Tests (non-running)

1. Disconnect generator leads T2 and T4 and regulator LO (pin 3) from the terminal block (Neutral, AC LO or ground). Some models require additional leads to be disconnected.

2. Open the AC circuit breaker to isolate the generator from all external circuits.

3. Set the LEAKAGE TEST selector to MAIN STATOR and press the LEAKAGE button. If the LEAKAGE indicator does not come on, the leakage is OK. If LEAKAGE indicator comes on, the leakage resistance to ground is below 1 Meg ohm. If the STATOR AC VOLTS indicator comes on, it means the LO wire has not been disconnected (step 2 above).

Connect the black patch cord to the GROUND test jack and leave it there. Connect the other end to the Q2 test jack and repeat the leakage test. If the LEAKAGE indicator comes on, the leakage resistance from T1-T2 to Q1-Q2 is below 1 Meg ohm. Connect the patch cord to B2 and repeat the leakage test. If the LEAKAGE indicator comes on, the leakage resistance from T1-T2 to B1-B2 is below 1 Meg ohm. The test voltage may be read by connecting the DMM between the T1, T2 and GROUND test jacks. The test voltage should be at least 200 VDC. A leakage resistance, if present, will load this voltage down. The lower this voltage goes, the more severe the leak. This principle also applies to the leakage tests below. Disconnect the patch cord from B2 and leave the other end connected to GROUND.

NOTE: On some models, the LEAKAGE indicator will come on along with the L1 AC LINE indicator because of the small current drawn by the indicator. While this is normal, the MAIN STATOR leakage test is still inconclusive. In this case, and just for this test, isolate the main stator (as above) and disconnect the GENERATOR harness. Connect the red alligator clip to one end of the red patch cord and clip onto the stator terminal or wire T1. Connect the other end to the T1,T3 jack on the G-MAN. Set the LEAKAGE TEST selector to MAIN STATOR and press the LEAKAGE button. If the LEAKAGE indicator does not come on, the leakage is OK. If the LEAKAGE indicator comes on, the leakage resistance to ground is below 1 Meg ohm.

4. Set the LEAKAGE TEST selector to AUX STATOR (Q1-Q2) and press the LEAKAGE button. If the LEAKAGE indicator does not come on, the leakage is OK. If the LEAKAGE light comes on, the leakage resistance to ground is below 1 Meg ohm. Connect the patch cord to the B2 test jack and repeat the leakage test. If the LEAKAGE indicator comes on, the leakage resistance from Q1-Q2 to B1-B2 is below 1 Meg ohm. Disconnect the patch cord at both ends.

5. Set the LEAKAGE TEST selector to BAT. STATOR (B1-B2) and press the LEAKAGE button. If the LEAKAGE indicator does not come on, the leakage is OK. If the LEAKAGE indicator comes on, the leakage resistance to ground is below 1 Meg ohm.

6. Set the LEAKAGE TEST selector to FIELD (F1-F2) and press the LEAKAGE button. If the LEAKAGE indicator does not come on, the leakage is OK. If the LEAKAGE indicator comes on, the leakage resistance to ground is below 1 Meg ohm.

Rotor Leakage Test, Flying Ground

It is possible, although uncommon, to have a mechanically induced ground in the rotor that shows up only when it is spinning. This type of fault occurs when rotor windings shift slightly due to centrifugal force and/or temperature rise and can be difficult to track down. To perform this test, proceed as follows.

1. Set the LEAKAGE TEST selector to FIELD (F1-F2) and press the LEAKAGE button. If the LEAKAGE indicator does not come on, the leakage is OK. If LEAKAGE indicator comes on, the leakage resistance to ground is below 1 Meg ohm.

2. Start the engine and repeat step 2 above. If the LEAKAGE indicator comes on only when the engine is running, this indicates a flying ground. If possible, verify results with a VOM (such as a Simpson 260) connected between the F1(+) and GROUND test jacks. Repeat the test to be certain before replacing an expensive rotor. NOTE: A digital meter (such as a Fluke) will not give accurate resistance readings on low ohms if there is any residual voltage present in the circuit, even a few millivolts.

GENERATOR VOLTAGE TESTS

To prevent possible damage to external circuits or appliances, MAKE SURE that the *AC CIRCUIT BREAKER IS OFF* during control and generator testing.

1. The engine should be running normally and the FIELD VOLTS and STATOR AC VOLTS indicators should be on, showing that the regulator is working properly.

2. Connect the DMM to the red MAIN STATOR (T1,T3 – T2,T4) test jacks. Read 118-128 VAC at no-load. The ideal no-load voltage is approximately 123 VAC.

3. Connect the DMM to the yellow AUX. STATOR (Q1-Q2) test jacks. Read 140-160 VAC at no-load.

4. Connect the DMM to the blue BAT. STATOR (B1-B2) test jacks. Read 18-20 VAC at no-load.

Connect the DMM to the green FIELD (F1-F2) test jacks, observing polarity. Read 28-35 VDC at no-load. If the field voltage is abnormally high at no-load, check for brush and/or slip ring problems. The field voltage should rise in response to an AC load applied to the generator at approximately 8 volts per KW of load. The field voltage will also rise with temperature because of an increase in rotor resistance.

REGULATOR TESTS

To prevent possible damage to external circuits or appliances, MAKE SURE that the *AC CIRCUIT BREAKER IS OFF* during control and generator testing.

1. Connect the G-MAN CONTROL, GENERATOR and REGULATOR harnesses.

2. Start the engine. If the FIELD VOLTS and STATOR AC VOLTS indicators are not on, proceed to step 4. Otherwise measure the frequency at the MAIN STATOR (T1,T3-T2,T4) test jacks and adjust the governor if necessary for 60-62 Hz. If the frequency is out of tolerance with an electronic governor, replace the governor.

3. Measure the voltage at the MAIN STATOR (T1,T3-T2,T4) test jacks. If this voltage is below 115 VAC or above 130 VAC at no-load, shut down the engine. Substitute a known good regulator and repeat the test. If the voltage is now within tolerance, the regulator is faulty and must be replaced. If the voltage is still high, check the wiring between generator terminal T1 and regulator pin 2. An open circuit on this wire will cause an overvoltage condition. If the voltage is low, check the wiring between AC LO or NEUTRAL and regulator pin 3, and the wiring between regulator pins 4 and 5 or 1 and 5, as applicable. NOTE: Some models use a potentiometer between these pins instead of a jumper. If the circuit between 4-5 (or 1-5) is open, the generator output will only be about 70 VAC.

4. This step applies only if the regulator will not start (no voltage buildup). Substitute a known good regulator and repeat the test. If the MAIN STATOR voltage is now within tolerance, the regulator is faulty and must be replaced. If the FIELD VOLTS and STATOR AC VOLTS indicators are still not on, check the wiring between the control board and regulator pin 7. NOTE: Pressing the FIELD FLASH button applies approximately 11.5 VDC directly to regulator pin 7 and the FIELD FLASH test jack. If the regulator is disconnected or not making contact at pin 7, the voltage at this jack will be slightly higher, typically 11.9 to 12.0 VDC. This is one way to determine if pin 7 is making contact. If pin 7 is known to be making contact, and the regulator will not start, check the wiring between ground and regulator pin 3. If the field flash circuit is working properly, pressing the FIELD FLASH button with the generator running will cause a sudden rise in voltage (to 160 VAC) at the MAIN STATOR test jacks. If not, the regulator is likely defective. Do step 5 to be sure.

5. This step tests the generator without the regulator, by supplying field current from an outside source. DISCONNECT REGULATOR. Connect the red patch cord between the FIELD FLASH test jack and the F1(+) test jack. Connect the black patch cord between GROUND and the F2(-) test jack. Connect the DMM to the MAIN STATOR test jacks. Start the engine and observe that there is little or no voltage being produced. Press and hold the FIELD FLASH button. If the generator is working properly, the DMM should read approximately 50 VAC, and the STATOR AC VOLTS indicator will glow dimly (it may not be bright enough to see in direct sunlight). The AUX. STATOR (Q1-Q2) should read approximately 60 VAC and the BAT. STATOR (B1-B2), if equipped, should read approximately 8.0 VAC. These voltages are approximately 40% of rated voltage. If step 4 above failed, and this step succeeds, the regulator is defective.

6. When all regulator problems have been resolved, the genset should be load tested with the regulator that is to remain installed. Proceed as follows:

a) Connect the DMM at the MAIN STATOR test jacks.

b) Make sure that there is no commercial power connected to the system. Connect a convenient load, such as a ceramic-type electric heater, to the external circuit outlet and close the AC line circuit breaker. More than one heater may be needed.

c) Start the generator and add load in approximately 1 KW increments.

d) The MAIN STATOR voltage should ideally be within 123 VAC at no-load and 117 VAC at full rated load. The quadrature voltage between the Q1 and Q2 test jacks should remain nearly constant at 140-150 VAC. The rectified quadrature voltage between the F1(+) test jack and the GROUND test jack should remain nearly constant at 195-205 VDC.

e) The field voltage at the F1(+) and F2(-) test jacks should start out at 28-35 VDC with a cold generator at no-load, and increase as load is added. A typical rate of rise of field voltage for a 4 KW generator is about 7.5 to 8.0 VDC for each 1 KW of load. At a load of 4 KW, the field voltage should be approximately 62-66 VDC. This voltage will rise slightly as the windings heat up, even at constant load, because of the increase of winding resistance with rising temperature.

<u>NOTE</u>:

A series of useful charts appear on the following pages.

APPLICATION CHART FOR 120V 60 Hz RV GENERATORS

SERIES	MODEL	SPEC	KW	FUEL	CONTROL BOARD	G-MAN CONTROL ADAPTER	REGULATOR	GOVERNOR
Emerald	BGE	A-E	4.0	Gas	300-2784	56-A360-2784	Transformer	Mechanical
	BGE	F,G	4.0	Gas	300-3056	56-A360-3056	305-0782	Mechanical
	BGE	H-M	4.0	Gas	300-3763	56-A360-3763	305-0809	Mechanical
	BGE	N & up	4.0	Gas	300-4901	56-A360-4901	305-0809	Mechanical
	BGEL	A-D	4.0	LP	300-2943	56-A360-2784	Transformer	Mechanical
	BGEL	E-G	4.0	LP	300-3056	56-A360-3056	305-0809	Mechanical
	BGEL	H-M	4.0	LP	300-3763	56-A360-3763	305-0809	Mechanical
	BGEL	N & up	4.0	LP	300-4901	56-A360-4901	305-0809	Mechanical
	NHE	A-C	6.5	Gas	300-2784	56-A360-2784	Transformer	Mechanical
	NHE	D-G	6.5	Gas	300-3056	56-A360-3056	305-0782	Mechanical
	NHEL	A-C	6.3	LP	300-2943	56-A360-2784	Transformer	Mechanical
	NHEL	D,E & G	6.3	LP	300-3056	56-A360-3056	305-0782	Mechanical
Marquis	BGM	A	5.5	Gas	300-3056	56-A360-3056	305-0826	Mechanical
	BGM	A	5.5	Gas	300-3763	56-A360-3763	305-0826	Mechanical
	BGM	B-F	5.5	Gas	300-3764	56-A360-3764	305-0826	151-0752
	BGM	G	5.5	Gas	300-4902	56-A360-3764	305-0826	151-0752
	NHM	A	6.8	Gas	300-3056	56-A360-3056	305-0782	Mechanical
	NHM	A	6.8	Gas	300-3763	56-A360-3763	305-0826	Mechanical
	NHM	B-F	6.8	Gas	300-3764	56-A360-3764	305-0826	151-0752
	NHM	G	6.8	Gas	300-4902	56-A360-3764	305-0826	151-0752
Microlite	KV	A,B	2.8/2.5	Gas/LP	None	N/A	305-0852	Mechanical
	KV	C-F	2.8/2.5	Gas/LP	300-5299	56-A360-5299	305-0897	Mechanical
	KY	A	4.0/3.6	Gas/LP	300-4155	56-A360-4155	305-0851	Mechanical
	KY	B-E	4.0/3.6	Gas/LP	300-4320	56-A360-4320	305-0851	Mechanical
	KY	F-H	4.0/3.6	Gas/LP	300-4923	56-A360-4320	305-0851	Mechanical
	KY	J-L	4.0/3.6	Gas/LP	300-5046	56-A360-1413	300-5046	Mechanical
Camp Power	KVC	A	2.8	Gas	300-5299	56-A360-5299	305-0897	Mechanical
	KVD	A	2.8/2.5	Gas/LP	300-5299	56-A360-5299	305-0897	Mechanical
	KYD	A	4.0/3.6	Gas/LP	327-1413	56-A360-1413	327-1413	Mechanical
Mobile Genset	HGJAB	A	5.5/7.0	Gas	300-5374	56-A360-5374	300-5374	Mechanical
	HGJAC	A	5.5/7.0	Gas	300-5374	56-A360-5374	300-5374	Mechanical

APPLICATION CHART FOR 120/240V 60 Hz COMMERCIAL MOBILE GENERATORS

SERIES	MODEL	SPEC	KW	FUEL	CONTROL BOARD	G-MAN CONTROL ADAPTER	REGULATOR	GOVERNOR
Emerald Commercial	BGD	A-C	4.5	Gas/LP	300-3056	56-A360-3056	305-0809-05	Mechanical
	BGD	D-H		Gas/LP	300-3763	56-A360-3763	305-0809-05	Mechanical
	BGD	J & up		Gas/LP	300-5002-01	56-A360-5002KIT	305-0911	Mechanical
	NHD	A-C	6.3-6.5	Gas/LP	300-3056	56-A360-3056	305-0809-05	Mechanical
	NHD	D-H		Gas/LP	300-3763	56-A360-3763	305-0809-05	Mechanical
	NHD	J & up		Gas/LP	300-5002-01	56-A360-5002KIT	305-0911	Mechanical
Mobile Genset	HGJAA	A	5.5-7.0	Gas-EFI	300-5047		300-5047	300-5047
	HGJAB	A-D	5.5-7.0	Gas/LP	300-5374	56-A360-5374	300-5374	Mechanical
	HGJAC	A-C	5.5-7.0	Gas/LP	300-5374	56-A360-5374	300-5374	Mechanical
	HGJAD	A-C	5.5-7.0	Gas-EFI	300-5047		300-5047	300-5047
	HGJAE	A-C	5.5-7.0	Gas/LP	300-5047		300-5047	300-5047
	HGJAF	A-C	5.5-7.0	Gas/LP	300-5047		300-5047	300-5047
Quiet Diesel	HDCAA	A	10.0	Diesel	305-0953-03		305-0953-03	305-0953-03
	HDCAB	A	12.0	Diesel	305-0953-03		305-0953-03	305-0953-03
	HDCAC	A-B	10.0	Diesel	305-0953-03		305-0953-03	305-0953-03
	HDCAC	C	10.0	Diesel	327-1440-02		327-1440-02	327-1440-02
	HDCAD	A-B	12.0	Diesel	305-0953-03		305-0782	305-0953-03
	HDCAD	C	12.0	Diesel	327-1440-02		327-1440-02	327-1440-02

CONTROL BOARD P/N SUPERCEDENCE

ORIGINAL P/N	SUPERCEEDS TO P/N		
300-2784	300-2943		
300-3056	300-3687	300-3950	
300-3763	300-5268		
300-3764	300-5342		
300-3797	300-4155		
300-4320	300-4923		
300-4506	300-5002	300-5002-01	
300-4901	300-5337		
300-4902	300-5276		
300-4902	300-5299		
300-5046	327-1413		

REGULATOR PIN ASSIGNMENT

FSI Model Number	305	305	305-5	305-2.8	826	911	
Onan Part Number(s)	305-0782-01			305-0852			327-1413
	305-0809-01	305-0851	305-0809-05	305-0897	305-0826	305-0911	300-5046
FUNCTION							
AC Sense HI	2	2	2	2	2	2	J1-4
AC Sense LO/Gnd	3	3	3	3	3	3	J1-5
Voltage Adjust	4	4	4	1	4	4	internal
Voltage Adjust Return	5	5	5	5	5	5	internal
Capacitor Negative	6	n/c	6	6	n/c	n/c	internal
Field Flash	7	7	7	7	7	7	internal
Case Ground					8	8	
Capacitor Positive	8	n/c	8	8	n/c	n/c	internal
Field F1(+)	9	9	9	9	9	9	J1-1
Field F2(-)	10	10	10	10	10	10	J1-10
Quad (Aux) Stator Q1	11	11	11	11	11	11	J1-9
Quad (Aux) Stator Q2	12	12	12	12	12	12	J1-3

LOCATION OF OIL PRESSURE / LEVEL SWITCHES ON RV GENERATORS

SERIES	MODEL	SPEC	LOCATION AND ACCESS OF SWITCH
Emerald	BGE	All	Oil Level switch located at base of oil filter. Remove sheet metal panel surrounding oil filter to gain access.
	BGEL	All	
	NHE	All	
	NHEL	All	
Marquis	BGM	All	
	NHM	All	
Microlite	KV	All	Oil Level switch located inside of oil pan.
	KY	All	Oil level switch located on right side of oil pan.
Camp Power	KVC	All	Oil level switch located inside of oil pan.
	KVD	All	
	KYD	All	Oil level switch located on right side of oil pan.
Mobile Genset	HGJAB	All	Oil pressure switch located on main bearing cover above oil filter.
	HGJAC	All	

<u>PLEASE NOTE</u>:

Due to their size, charts on following 2 pages are shown lengthwise (landscape format).

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CONTROL BOARD PIN ASSIGNMENT

			300-3950										
		300-2943	300-3687	300-5268	300-5342	300-4155	300-4923	300-5337	300-5276	300-5299		327-1413	
CONTROL BOARD	**G-MAN**	**300-2784**	**300-3056**	**300-3763**	**300-3764**	**300-3797**	**300-4320**	**300-4901**	**300-4902**	**300-4456**	**300-5002**	**300-5046**	**300-5374**
FUNCTION	J-101												
RUN RLY CONT.	1	P1-4	n/c	n/c	P1-5	n/c	n/c	n/c	P1-5	n/c	n/c	n/c	n/c
FUEL PUMP	2	P2-6 *	P3-6	P1-12	P1-4	J1-12	P1-2	P1-12	P1-4	P1-1	J1-3	J1-18	J1-18
FUEL SOLENOID	3	n/c	n/c	n/c	P1-6 **	n/c	P1-3	n/c	P1-6 **	n/c	J1-2#	J1-11	J1-11
L1 AC LINE	4	n/c	n/c	n/c	n/c	n/c	P1-4	n/c	n/c	n/c	J4-L1	J1-4	J1-4
GROUND	5	P1-8 P2-1	P1-8	P1-11	P1-1	J1-4	P1-5	P1-11	P1-1	P1-7	J3-LO	J1-6	J1-6
START SOLENOID	6	P1-2	P1-2	P1-9	P1-2	J1-8	P1-6	P1-9	P1-2	P1-3	P6-1	J1-16	J1-16
BAT. CHG. RES.	7	P1-1	P1-4	P1-3	n/c	n/c	n/c	P1-3	n/c	n/c	n/c	n/c	n/c
IGNITION ENABLE	8	n/c	n/c	n/c	n/c	J1-6	P1-11	n/c	n/c	P2-4	n/c	J1-15	J1-15,20
FIELD FLASH	9	P1-5	P1-5	P1-1	P1-3	J1-5	P1-9	P1-1	P1-3	P2-3	J1-5	n/c	P102-7
BATTERY POS.	10	P1-6	P1-6	P1-7	P1-7	J1-10	P1-10	P1-7	P1-7	P1-4	J1-1	J1-8	J1-8
IGNITION	11	P1-3	P3-3	P1-6	P1-12	n/c	n/c	P1-6	P1-12	n/c	J1-4	J1-19, 23	J1-19, 23
OIL LOL/LOP SW	12	P1-4	P3-4	P1-5	P1-5	J1-7	P1-12	P1-5	P1-5	n/c	J1-6	J1-7	J1-13
LP SHUTDOWN	13	P2-2	P3-2	P1-10	n/c	n/c	n/c	P1-13	n/c	n/c		J1-14	J1-14
B1	14	n/c	P1-1	P1-2	n/c	J1-9	n/c	P1-2	n/c	P2-1	P3-1	n/c	n/c
B2	15	n/c	P1-7	P1-4	n/c	J1-11	n/c	P1-4	n/c	P2-2	P3-2	n/c	n/c
LOCAL START		P3-3				J1-1	P1-13				J10	J1-7	J1-7
LOCAL STOP		P3-2				J1-2	P1-1				J9	J1-14	J1-14
LOCAL RETURN		P3-1				J1-3	P1-7				J8	J1-5	J1-5
REMOTE START			P2-3	J2-3	J2-3		J2-3	P1-14	P1-9	P1-6	J2-2	J1-7	J1-7
REMOTE STOP			P2-2	J2-2	J2-2		J2-2	P1-10	P1-8	P1-5	J2-1	J1-14	J1-14
REMOTE RETURN			P2-1	J2-1	J2-1		J2-1		n/c	P1-8	J2-5	J1-5	J1-5
BAT. METER			P2-5	J2-5	J2-5		J2-5	P1-16	P1-11	n/c	J2-4	J1-19	J1-19
TIME TOTAL			P2-6	J2-6	J2-6		J2-6	P1-15	P1-10	P1-2	J2-3	J1-19	J1-19
STATUS												J1-23	J1-23
PMG+											J1-7		
PMG-											J1-8		

NOTES: * Remote Run Simulation
** 12 VDC to Electronic Governor
12 VDC to Electric Choke

Revised: 3/28/07

TEST INFORMATION FOR TROUBLESHOOTING RV GENERATORS WITH THE G-MAN

CONTROL BOARD P/N	300-2943 300-2784	300-3950 300-3687 300-3056	300-5268 300-3763	300-5342 300-3764	300-4155 300-3797	300-4923 300-4320	300-5337 300-4901	300-5276 300-4902	300-5299 300-4456	300-5002	327-1413 300-5046	300-5374
G-MAN INDICATION												
12 VDC POWER	On as soon as connected	On as soon as connected	On as soon as connected	On as soon as connected	On as soon as connected	On as soon as connected	On as soon as connected	On as soon as connected	On as soon as connected	On as soon as connected	On as soon as connected	On as soon as connected
FIELD FLASH	No indication	On during cranking	On during cranking	On during cranking	On during cranking	On during cranking	On during cranking	On during cranking	On during cranking	On during cranking	On during cranking	On during cranking
LOL/LOP SWITCH	Comes on with oil pressure	Comes on with oil pressure	Comes on with oil pressure	Goes off with oil pressure	Comes on if low oil level	Comes on if low oil level	Comes on with oil pressure	Goes off with oil pressure	No access	Comes on with oil pressure	On when STRT is pressed	Goes off with oil pressure
RUN RELAY	Comes on with oil pressure	Comes on with B1-B2 Volts	Comes on with B1-B2 Volts	Comes on if gov. J6B is low	Comes on with B1-B2 Volts	Comes on with L1 AC	Comes on with B1-B2 Volts	Comes on if gov. J6B is low	Comes on with B1-B2 Volts	Comes on with L1 AC	Comes on with L1 AC	Comes on with L1 AC
FIELD VOLTS	On if field volts > 35 VDC	On if field volts > 35 VDC	On if field volts > 35 VDC	On if field volts > 35 VDC	On if field volts > 35 VDC	On if field volts > 35 VDC	On if field volts > 35 VDC	On if field volts > 35 VDC	On if field volts > 35	On if field volts > 35 VDC	On if field volts > 35 VDC	On if field volts > 35 VDC
STATOR AC VOLTS	On if stator volts > 75	On if stator volts > 75	On if stator volts > 75	On if stator volts > 75	On if stator volts > 75	On if stator volts > 75	On if stator volts > 75	On if stator volts > 75	On if stator volts > 75	On if stator volts > 75	On if stator volts > 75	On if stator volts > 75
L1 AC VOLTS	N/A	N/A	N/A	N/A	N/A	On if stator volts > 75	N/A	N/A	N/A	On if stator volts > 75	On if stator volts > 75	On if stator volts > 75
LP SHUTDOWN**	Goes off when Ign. and K5 on	Goes off when Ign. and K5 on	Goes off when Ign. and K5 on	Goes off when Ign. and K5 on	Goes off when Ign. and K5 on	Goes off when Ign. and K5 on	Goes off when Ign. and K5 on	Goes off when Ign. and K5 on	No access	N/A	On when STOP is pressed	On when STOP is pressed
G-MAN TEST JACKS												
12 VDC POWER	12.6-12.8 VDC	12.6-12.8 VDC	12.6-12.8 VDC	12.6-12.8 VDC	12.6-12.8 VDC	12.6-12.8 VDC	12.6-12.8 VDC	12.6-12.8 VDC	12.6-12.8 VDC	12.6-12.8 VDC	12.6-12.8 VDC	12.6-12.8 VDC
FIELD FLASH	No access	10-11 VDC	10-11 VDC	10-11 VDC	10-11 VDC	10-11 VDC	10-11 VDC	10-11 VDC	10-11 VDC	10-11 VDC	10-11 VDC	10-11 VDC
LOL/LOP SWITCH	0-0.5 VDC	0-0.5 VDC	0-0.5 VDC	0-0.5 VDC	11-14 VDC	11-14 VDC	0-0.5 VDC	0-0.5 VDC	No access	0-0.5 VDC	No access	11-14 VDC
BAT. CHG. VOLTS	12 VDC	18-20 VDC	18-20 VDC	12 VDC	18-20 VDC	N/A	18-20 VDC	12 VDC	18-20 VDC	N/A	N/A	N/A
LP SHUTDOWN**	11-14 VDC	11-14 VDC	11-14 VDC	11-14 VDC	11-14 VDC	11-14 VDC	11-14 VDC	11-14 VDC	11-14 VDC	11-14 VDC	11-14 VDC	11-14 VDC
GENSET INFORMATION												
BAT. CHG. RES. TEST	P1-1 to GND	P1-4 to GND	P1-3 to GND	CR10- to GND	CR1+ to BAT+	N/A	P1-3 to GND	J1-4 to GND	No access	N/A	N/A	N/A
B1-B2 or BATTERY CHARGING VOLTAGE	P1-8 to P1-1 18-26 VAC	P1-1 to P1-7 14-16 VAC	P1-2 to P1-4 14-16 VAC	BAT+ to GND Note B+ rise	J1-9 to J1-11 14-16 VAC	BAT+ to GND Note B+ rise	P1-2 to P1-4 14-16 VAC	BAT+ to GND Note B+ rise	P2-1 to P2-2 14-16 VAC	BAT+ to GND Note B+ rise	VR2 AC to AC 14-16 VAC	N/A
TYPE OF IGNITION	COIL	COIL	COIL	COIL	MAGNETO	MAGNETO	COIL	COIL	MAGNETO	COIL	MAGNETO	MAGNETO
GOVERNED RPM (60Hz)	1800	1800	1800	1800	3600	3600	1800	1800	3600	1800	3600	3600
ROTOR RES. TYP @77F	22-28 OHMS	22-28 OHMS	22-28 OHMS	22-28 OHMS	18-27 OHMS	18-27 OHMS	22-28 OHMS	22-28 OHMS	18-27 OHMS	22-28 OHMS	22-28 OHMS	29-35 OHMS
CONDITIONS REQUIRED TO KEEP RUNNING	LOP to GND B1-B2 Volts	LOP to GND B1-B2 Volts	LOP to GND B1-B2 Volts	LOP Open P1-5 to GND	LOL Open B1-B2 Volts	LOL Open L1 AC Volts	LOP to GND B1-B2 Volts	LOP Open P1-5 to GND	LOL Open* P2-4* un-GND	LOP to GND L1 AC Volts	LOL Open* L1 AC Volts	LOP Open L1 AC Volts
GOVERNOR OEM P/N	Mechanical	Mechanical	Mechanical	151-0752	Mechanical	Mechanical	Mechanical	151-0752	Mechanical	Mechanical	Mechanical	Mechanical
REGULATOR OEM P/N	Transformer	305-0809-01	305-0809-01	305-0826	305-0851	305-0851	305-0809-01	305-0826	305-0897	305-0911	327-1413	300-5374

* Low oil level switch (LOL) is hard-wired to Magneto Kill (Ignition Enable) on this model. ** LP Models only.

Revised 12/18/08